

U.S. Serial No. 10/620,059
Reply to Office Action of: 05/18/2004
Family Number: P2002J071 US2

Page 4 of 14

AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended) A device to extend the useful life of a lubricant in an EGR equipped engine comprising:

- a) ~~A~~ a chemical filter placed in the EGR stream; and
- b) ~~A~~ a heat exchanger /cooler placed in the upstream of the filter to reduce the temperature of said EGR stream and to increase the relative humidity.

Claim 2 (currently amended) ~~A~~ The device as in Claim 1 wherein the chemical filter is placed in said EGR stream wherein the temperature of the EGR stream is such that the relative humidity of the EGR stream is greater than about 20%.

Claim 3 (currently amended) ~~A~~ The device as in Claim 1 wherein the chemical filter is placed in said EGR stream wherein the temperature of the EGR stream is such that the preferred relative humidity of the EGR stream is greater than about 50%.

Claim 4 (currently amended) A method to extend the useful life of an EGR equipped internal combustion engine ~~using the system described in Claim 1~~ comprising:

- a) placing a chemical filter in the EGR stream; and
- b) cooling the EGR stream using a heat exchanger/cooler thereby increasing the relative humidity of the EGR stream, the heat exchanger/cooler being placed upstream of the filter, whereby acidic components in the EGR stream are removed by the chemical filter before the EGR stream is introduced into the intake manifold.

U.S. Serial No. 10/620,059
Reply to Office Action of: 05/18/2004
Family Number: P2002J071 US2

Page 5 of 14

Claim 5 (currently amended) A device to extend the useful life of a lubricant in an EGR equipped engine comprising:

- a) An an optional chemical filter placed in the EGR stream;
- b) ~~A~~ a chemical filter placed just before the intake manifold; and
- c) A a heat exchanger / cooler placed in the upstream of the chemical filters to reduce the temperature of said EGR stream and to increase the relative humidity.

Claim 6 (currently amended) ~~A~~ The device as in Claim 5 wherein the chemical filter is placed in ~~said~~ locations in the EGR stream wherein the temperature of the EGR stream is such that the relative humidity of the EGR stream is greater than about 20%.

Claim 7 (currently amended) ~~A~~ The device as in Claim 5 wherein the chemical filter is placed in ~~said~~ locations in the EGR stream wherein the temperature of the EGR stream is such that the preferred relative humidity is greater than about 50%.

Claim 8 (currently amended) A method to extend the useful life of an EGR equipped internal combustion engine ~~using the system described in Claim 5~~ comprising:

- a) placing an optional chemical filter in the EGR stream;
- b) placing a chemical filter just before the intake manifold at a location after the EGR stream is merged with intake air; and
- c) cooling the EGR stream using a heat exchanger/cooler thereby increasing the relative humidity of the EGR stream, the heat exchanger/cooler being placed upstream of the filters, whereby acidic components in the EGR stream are removed by the chemical filters before the EGR stream is introduced into the intake manifold.

U.S. Serial No. 10/620,059
Reply to Office Action of: 05/18/2004
Family Number: P2002J071 US2

Page 6 of 14

Claim 9 (currently amended) A device to extend the useful life of a lubricant in an EGR equipped engine comprising:

- a) ~~A~~ a chemical filter placed in the EGR stream;
- b) ~~A~~ a heat exchanger / cooler placed in the upstream of the chemical filter to reduce the temperature of said EGR stream and to increase the relative humidity; and
- c) ~~An~~ an oil filter capable of neutralizing acids in the engine lubricant.

Claim 10 (currently amended) ~~A~~ The device as in Claim 9 wherein the chemical filter is placed ~~said in~~ locations in the EGR stream wherein the temperature of the EGR stream is such that the relative humidity is greater than about 20%.

Claim 11 (currently amended) ~~A~~ The device as in Claim 9 wherein the chemical filter is placed ~~said in~~ locations in the EGR stream wherein the temperature of the EGR stream is such that the ~~preferred~~ relative humidity is greater than about 50%.

Claim 12 (currently amended) A method to extend the useful life of an EGR equipped internal combustion engine ~~using the system described in Claim 9~~ comprising:

- a) placing a chemical filter in the EGR system;
- b) cooling the EGR stream using a heat exchanger/cooler thereby increasing the relative humidity of the EGR stream, the heat exchanger/cooler being placed upstream of the filter, whereby acidic components in the EGR stream are removed by the chemical filter before the EGR stream is introduced into the intake manifold; and

U.S. Serial No. 10/620,059
Reply to Office Action of: 05/18/2004
Family Number: P2002J071 US2

Page 7 of 14

- c) placing an oil filter into the lubricating system capable of neutralizing acids in the engine lubricant.

Claim 13 (currently amended) A device to extend the useful life of a lubricant in an EGR equipped engine comprising:

- a) ~~An~~ an optional chemical filter placed in the EGR stream;
- b) ~~A~~ a chemical filter placed just before the intake manifold at a location after the EGR stream is merged with intake air;
- c) ~~A~~ a heat exchanger/cooler placed in the upstream of the chemical filters to reduce the temperature of said EGR stream and to increase the relative humidity; and
- d) ~~An~~ an oil filter capable of neutralizing acids in the engine lubricant.

Claim 14 (currently amended) ~~A~~ The device as in Claim 13 wherein the chemical filter is placed ~~said in~~ locations in the EGR stream wherein the temperature of the EGR stream is such that the relative humidity is greater than about 20%.

Claim 15 (currently amended) ~~A~~ The device as in Claim 13 wherein the chemical filter is placed ~~said in~~ locations in the EGR stream wherein the temperature of the EGR stream is such that the preferred relative humidity is greater than about 50%.

Claim 16 (currently amended) A method to extend the useful life of an EGR equipped internal combustion engine ~~using the system described in Claim 13~~ comprising:

- a) placing an optional chemical filter in the EGR stream;
- b) placing a chemical filter just before the intake manifold at a location after the EGR stream is merged with intake air;

U.S. Serial No. 10/620,059
Reply to Office Action of: 05/18/2004
Family Number: P2002J071 US2

Page 8 of 14

- c) cooling the EGR stream using a heat exchanger/cooler thereby increasing the relative humidity of the EGR stream, the heat exchanger/cooler being placed upstream of the filter, whereby acidic components in the EGR stream are removed by the chemical filter before the EGR stream is introduced into the intake manifold; and
- d) placing an oil filter into the lubrication system capable of neutralizing acids in the engine lubricant.

Claim 17 (new) The device of claim 1, 5, 9 or 13 wherein the chemical filter is placed in locations in the EGR stream wherein the temperature of the EGR stream is only slightly above its dew point.

Claim 18 (new) The method of claim 4, 8, 12 or 16 wherein the EGR stream is cooled using a heat exchanger/cooler to a temperature only slightly above its dew point.